

What is claimed is:

1. A propulsion generation system for a marine vessel comprising:
 - a fuel cell;
 - an electrolyzer;
 - a motor; and
 - a motor drive that operates in a first position to connect said fuel cell and said motor to power said motor;wherein said motor drive operates in a second position to connect said electrolyzer to a power supply.
2. The propulsion generation system of claim 1, further comprising a DC-AC converter for converting direct current from said fuel cell to alternating current for said motor when said motor drive operates in said first position.
3. The propulsion generation system of claim 2, wherein said DC-AC converter converts alternating current from said power supply to direct current for said electrolyzer when said motor drive is in said second position.
4. The propulsion generation system of claim 1, further comprising a hydrogen storage in fluid communication with said fuel cell and electrolyzer and an oxygen storage in fluid communication with said fuel cell and electrolyzer.
5. The propulsion generation system of claim 4, wherein said fuel cell uses hydrogen from said hydrogen storage and oxygen from said oxygen storage to produce direct current.
6. The propulsion generation system of claim 5, wherein water is produced as a by-product by said fuel cell and is stored in a water storage.

7. The propulsion generation system of claim 3, wherein said electrolyzer uses direct current from said DC-AC converter to reduce water from a water storage into hydrogen and oxygen.
8. The propulsion generation system of claim 7, wherein said hydrogen is stored in said hydrogen storage and said oxygen is stored in said oxygen storage.
9. The propulsion generation system of claim 1, wherein said motor drive is switched from a first position to a second position through a mode switch.
10. The propulsion generation system of claim 1, wherein said power supply is a three-phase AC supply from a host ship.
11. The propulsion generation system of claim 1, wherein said motor is an AC propulsion motor.
12. The propulsion generation system of claim 1, further comprising a DC link capacitor in said motor drive for absorbing high frequency current.
13. The propulsion generation system of claim 1, wherein said marine vessel is an underwater vessel.
14. A propulsion generation method for a marine vessel comprising:
 - powering a motor by a fuel cell by operating a motor drive in a first position; and
 - powering an electrolyzer by a power supply by operating said motor drive in a second position.
15. The propulsion generation method of claim 14, further comprising converting direct current from said fuel cell to alternating current for said motor when said motor drive operates in said first position.

16. The propulsion generation method of claim 14, further comprising converting alternating current from said power supply to direct current for said electrolyzer when said motor drive is in said second position.

17. An apparatus for propulsion generation for a marine vessel comprising:

a fuel cell;

an electrolyzer;

a motor; and

a motor drive that operates in a first position to connect said fuel cell and said motor to power said motor;

wherein said motor drive operates in a second position to connect said electrolyzer to a power supply.

18. The propulsion generation apparatus of claim 17, further comprising a DC-AC converter for converting direct current from said fuel cell to alternating current for said motor when said motor drive operates in said first position.

19. The propulsion generation apparatus of claim 18, wherein said DC-AC converter converts alternating current from said power supply to direct current for said electrolyzer when said motor drive is in said second position.